

Toby Technical

Bulletin 16

Drying of Moisture Curing Polyurethanes

Moisture curing polyurethanes chemically react with moisture from the surroundings to form highly durable, chemical and scratch resistant coatings. Normally the application of one-component polyurethanes is without problems. However, to avoid problems, be aware of the drying process of these type of materials.

One-Component Polyurethane coatings dry in 2 steps.

1st Step: Evaporation of solvents and levelling of surface
Reaction of isocyanate with water (moisture) at the same time

2nd Step: Further reaction with water and curing of film

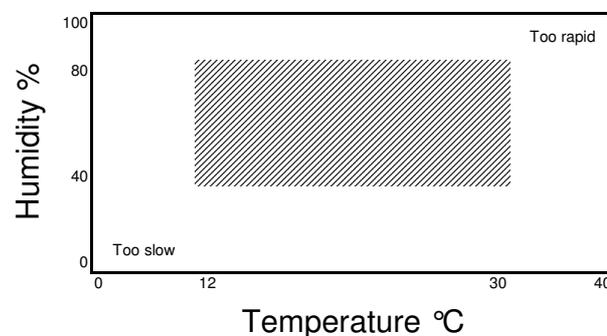
Drying time and final coating result is influenced by:

- Temperature
- Humidity
- Airflow
- Film thickness

Temperature & Humidity

Application Window

Influence of temperature and humidity on drying speed of moisture curing polyurethane's is shown in the following sketch.



Application Window of Moisture Curing Polyurethane

Every coating has a certain, specific application window.

The application window gives indication under what conditions the coating should be applied to minimise application problems. The recommended application window for moisture curing polyurethane's like, **Toby UNITHANE CLEAR GLOSS, Toby UNITHANE SATIN, Toby UNITHANE SEMI-GLOSS and Toby UNITHANE MATT, and Toby RAPID SEAL** is between 12°C and 30°C and 40-80% relative humidity.

While an application at 12°C and 40% r.h. will noticeably increase the drying time of the coatings, the same material applied at 80% r.h. and 30°C will cure significantly faster and is already in a critical range for blistering or other surface problems.

High Temperature I High Humidity

If temperature is over 30°C and combined with high humidity the coating dries too fast and problems in form of bubbling, blistering, bad levelling or orange peel may occur.

Low Temperature I High Humidity

Low temperature is also not a good environment to apply moisture curing polyurethanes. Low temperature drastically reduces the drying speed of the material and moisture can condense on the floor because of dewpoint conditions. Floorboards are often much colder than the surrounding air. Slower curing and surface defects are common problems.

Low Temperature I Low Humidity

Low temperature combined with low humidity creates an environment in which the drying process of the coating is drastically interfered. Even catalysed systems will still dry slowly.

High Temperature I Low Humidity

Although not as crucial as high temperature combined with high humidity the solvent evaporation can be too fast and streakiness, levelling problems or orange peel may occur.

Airflow

Apart from temperature and humidity the drying process also depends on airflow conditions during and after application. The higher the airflow, the quicker the drying speed of the material with increasing risk of surface defects. Uncontrolled airflow must be avoided.

Film Thickness

The applied film thickness depends on solids content, viscosity of the coating, application tool used, application technique and porosity of substrate.

Toby One Component Polyurethane Finishes can normally be catalysed (not recommended for **Toby UNITHANE MATT**, **SATIN** and **SEMI-GLOSS** finishes) with **Toby UNITHANE CATALYST** to reduce the curing time during cold weather periods. However, its usage on warm days is normally not recommended because of a too rapid curing process.

For further technical advice call our 7 Day a Week Technical Hotline on 1800 073 530.

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